

## **REMARKS:**

Claims 1-8 are in the case and presented for consideration.

Claims 1-5 have been amended to improve their form and to better define the invention and new Claims 7 and 8 have been added to even further distinguish the invention over the prior art.

## **DRAWINGS**

Please accept the attached replacement sheet of Figs. 1 and 2 wherein Fig. 2 has been corrected.

## **SPECIFICATION**

The specification has been amended so that it now contains proper section headings and to correct a scanning error in published paragraph [0020].

## **REJECTION OF CLAIMS UNDER 35 U.S.C. §103(a)**

Claims 1-6 were rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art of the instant disclosure in view of either of U.S. Patent 4,449,701 to Pitzer et al. ("Pitzer") or U.S. Patent 4,417,723 to Kitamura et al. ("Kitamura").

Applicants respectfully traverse the Office's rejections that the claims of the subject application are obvious in view of the cited prior art.

Both Pitzer and Kitamura fail to disclose the following critical elements claimed in

currently amended independent Claim 1 and in new independent Claim 7:

- small diameter coaxial metal tubes that form capillary channels at the first (gas outlet) side of the nest block;

- large diameter coaxial metal tubes at the second (gas inlet) side of the nest block;

and

- the second section at the second inlet side having a central tube closed on both ends and filled with a refractory material.

Additionally, neither cited reference nor the admitted prior art provides a teaching which would motivate one of ordinary skill in the art to combine these claimed elements from the admitted prior art and the cited references.

Like other prior art designs, it is Pitzer and Kitamura's lack of the aforementioned elements, as well as their lack of a sufficient teaching to motivate one of ordinary skill, which contributes to their inability to protect against breakouts of liquid metal.

Through use of the presently claimed invention, the problem of liquid metal breakouts is greatly reduced. The invention's ability to accomplish its unexpectedly successful reduction, of what up until now was an industry wide problem is furthered by the above mentioned elements of currently amended independent Claim 1 and even further advanced by the combination of Claim 7 that also defined the smooth tapering of diameter of the coaxial tubes as they approach the first or outlet section.

When liquid metal flows from a bath into the first section of the tuyere device, as it begins to flow into the second part, the surface area in contact with a penetrating liquid metal and hence the friction between them is greatly increased due to the larger diameter of the second section of the tuyere device. An even further increase in the surface area

in contact with a penetrating liquid metal is also provided by the conical rod coaxially located in the central operating channel. Secondly, the flow of a liquid metal stops due to the gaps of said annular operating channels being in the form of capillaries for the liquid metal. Additionally, it is at this point that the central tube filled with a refractory material begins to exert its influence on a penetrating liquid metal reducing its viscosity and hence further retarding its flow.

Moreover, although both Pitzer and Kitamura disclose an encased refractory component, as is common in the prior art, they only show a similar element running the entire length of the respective operating channels. Furthermore, Pitzer and Kitamura do not disclose or suggest a different configuration, nor do they provide a reason why an encased refractory component should be different.

By contrast, the present invention claims an atypical refractory component configuration which comes together with the other claimed elements to produce unexpectedly successful results in greatly reducing the problems associated with the prior art.

Therefore, because both Pitzer and Kitamura fail to disclose or suggest critical elements claimed in currently amended independent Claims 1 and 7, from which all other claims depend, and because neither reference provides a teaching, suggestion or motivation which would lead one of ordinary skill in the art to arrive at the presently claimed invention, none of the claims currently in the case are rendered obvious in view of either Pitzer or Kitamura alone, or any combination thereof.

Accordingly, the application and claims are believed to be in condition for allowance, and favorable action is respectfully requested.

No new matter has been added.

If any issues remain, the Examiner is respectfully invited to contact the undersigned at the number below, to advance the application to allowance.

Respectfully submitted,  
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